

Appl. No. 09/661,214
Amdt. dated August 17, 2004
Reply to Office action of June 7, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method for training a communication link that includes a plurality of data lanes coupling first and second ports in a computing system, communicating information in a computing system the communication link is trained in order to correct for errors including data inversion, lane skewing and lane order errors that may be caused by the communication link, the method comprising:

locking a the communication link that comprises a plurality of data lanes by transmitting a first link training sequence from the first and second ports and synchronizing the receipt of the first link training sequence at the first and second ports;

handshaking across the locked link to indicate readiness for data transmission by sending a first link training sequence that contains a lane identifier of at least one of the plurality of data lanes from the first port to the second port; and

transmitting information after handshaking across the locked link; and using the first link training sequence to correct for errors caused by the communication link.

2. (Cancelled).

3. (Currently amended) The method of claim 21, wherein synchronizing the receipt of the first link training sequence includes at least one of:

synchronizing code group recognition; and
de-skewing multiple physical links.

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4. (Currently amended) The method of claim 21, wherein transmitting the first link training sequence includes transmitting an 8b/10b special symbol followed by a repeated data symbol.

5. (Original) The method of claim 4, wherein the 8b/10b special symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

6. (Original) The method of claim 4, wherein transmitting a comma control symbol followed by a repeated data symbol comprises transmitting the following sequence:

K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2

7. (Original) The method of claim 4, wherein transmitting the 8b/10b special symbol followed by a repeated data symbol includes transmitting the 8b/10b special symbol, followed by a lane identifying symbol, followed by the repeated data symbol.

8. (Currently amended) The method of claim 21, wherein synchronizing the receipt of the first link training sequence includes:

capturing a comma control symbol from the first link training sequence transmitted by the second port in a queue associated with the first port;

clocking code groups from the first link training sequence transmitted by the second port into the first queue and bit groups from the first link training sequence transmitted by the first port into a queue associated with the second port until a comma control symbol from the first link training sequence transmitted by the first port is clocked into the queue associated with the second port; and

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clearing the queues if a comma control symbol is not clocked into the queue associated with the second port from the first link training sequence transmitted by the first port within $N/2$ clock cycles, where N is the length of the first link training sequence.

9. (Currently amended) The method of claim 1, wherein handshaking across the locked link includes transmitting a second link training sequence from the first and second ports upon the synchronized receipt of the first link training sequence at the first and second ports.

10. (Currently amended) The method of claim 9, wherein transmitting the second link training sequence includes transmitting a comma control symbol followed by a repeated data symbol.

11. (Original) The method of claim 10, wherein the comma control symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

12. (Currently amended) The method of claim 9, wherein transmitting the second link training sequence includes transmitting the following ordered set:
K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5

13. (Currently amended) A method for training a link ~~links~~ between first and second ports in a computing system in order to correct for errors that may be caused by the links, the method comprising:

transmitting a first link training sequence of code groups from ~~a the~~ first port and ~~a the~~ second port, wherein the first port and the second port are configured to send and receive data on a plurality of data lanes, and the first link training sequence of code groups contains a lane identifier of at least one of the plurality of data lanes;
synchronizing the receipt of the first link training sequence at the first and second ports; and

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transmitting a second link training sequence of code groups from the first and second ports upon the synchronized receipt of the first link training sequence at the first and second ports; and
receiving the second link training sequence transmitted by the first and second ports and the second and first ports, respectively, in synchrony.

14. (Currently amended) The method of claim 13, wherein transmitting the first link training sequence includes transmitting a comma control symbol followed by a repeated data symbol.

15. (Original) The method of claim 14, wherein the comma control symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

16. (Original) The method of claim 14, transmitting a comma control symbol followed by a repeated data symbol comprises transmitting the following sequence:

K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2

17. (Original) The method of claim 14, wherein transmitting the 8b/10b special symbol followed by a repeated data symbol includes transmitting the 8b/10b special symbol, followed by a lane identifying symbol, followed by the repeated data symbol.

18. (Currently amended) The method of claim 13, wherein synchronizing the receipt of the first link training sequence includes:

capturing a comma control symbol from the first link training sequence transmitted by the second port in a queue associated with the first port;

clocking bit groups from the first link training sequence transmitted by the second port into the first queue and code group from the first link

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training sequence transmitted by the first port into a queue associated with the second port until a comma control symbol from the first link training sequence transmitted by the first port is clocked into the queue associated with the second port; and clearing the queues if a comma control symbol is not clocked into the queue associated with the second port from the first link training sequence transmitted by the first port within $N/2$ clock cycles, where N is the length of the first link training sequence.

19. (Currently amended) The method of claim 13, wherein transmitting the second link training sequence includes transmitting a comma control symbol followed by a repeated data symbol.

20. (Original) The method of claim 13, wherein the comma control symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

21. (Currently amended) The method of claim 13, wherein transmitting the second link training sequence includes transmitting the following ordered set:

K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5

22. (Currently amended) A method for training a link in a computing system having first and second ports each including a receiver and a transmitter in order to correct for errors that may be caused by the link, comprising:

configuring ~~the a first receiver in a the~~ first port using a first link training sequence transmitted by the second port or a second training sequence, wherein the first port is configured to send and receive data on a plurality of data lanes, and the first training sequence contains a lane identifier of at least one of the plurality of data lanes;

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transmitting ~~the a~~ second link training sequence from the first port to the
second port indicating the ~~first~~ receiver in the first port is
configured; and

receiving ~~a the~~ second link training sequence transmitted by ~~a the~~ second
port at the first port, the second link training sequence transmitted
by the second port and received by the first port indicating that a
~~second the~~ receiver in the second port is configured.

23. (Currently amended) The method of claim 22, wherein transmitting the
first link training sequence includes transmitting an 8b/10b special symbol
followed by a repeated data symbol.

24. (Original) The method of claim 23, wherein the 8b/10b special symbol is
a K28.5, K28.1, or a K28.7 comma control symbol.

25. (Original) The method of claim 23, wherein transmitting a comma control
symbol followed by a repeated data symbol comprises transmitting the following
sequence:

K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2

26. (Original) The method of claim 23, wherein transmitting the 8b/10b
special symbol followed by a repeated data symbol includes transmitting the
8b/10b special symbol, followed by a lane identifying symbol, followed by the
repeated data symbol.

27. (Currently amended) The method of claim 22, wherein transmitting the
second link training sequence includes transmitting a comma control symbol
followed by a repeated data symbol.

28. (Original) The method of claim 27, wherein the comma control symbol is
a K28.5, K28.1, or a K28.7 comma control symbol.

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29. (Currently amended) The method of claim 22, wherein transmitting the second link training sequence includes transmitting the following ordered set:

K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5.

30. (Original) The method of claim 22, further comprising transmitting data from one of the first or second ports to the other of the first and second ports.